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Pao-Li Chang

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Institutional Complementarity across Countries in Bilateral FDI Flows: Theory and Evidence*

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December 10, 2015

Abstract

This paper builds a theory to characterize the comparative advantage of MNEs based in countries of different institutional qualities. It is shown that MNEs headquartered in countries of poorer state institutions will invest more in 'informal institutions' and choose to undertake FDI in countries of weaker institutions. At the aggregate, MNEs on average generate more net profits in countries of weaker institutions, the poorer the institutional environment at home. I conduct an extensive test of the theory using bilateral FDI volume for 219 economies in year 2001-2010. The results indicate a statistically significant and robust institutional complementarity effect in bilateral FDI volume.

Key Words: Informal Institution; Foreign Direct Investment; Gravity Equation; Tobit

JEL Classification: C21; C23; C24; F21; F23

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1 Introduction

The accumulated knowledge of the FDI literature (see for example the survey by Helpman, 2006) has provided us a good understanding of the incentives and constraints of multinational enterprises (MNEs) in their choices (of organizational forms and production locations) in response to their own characteristics, the nature of the industry, and the country where they operate from. In these existing theoretical frameworks, however, MNEs are often theorized to be based in the North. This supposition, although understandable given the North MNEs' leading edge in R&D and technology, is increasingly incongruent with the facts. In 2006-2010, 17% of the world FDI outflows originate from the South (Dixit, 2012). At the same time, the share of FDI inflows received by the developing country from the peer South is disproportionately larger at 36% in 2000 (Aykut and Ratha, 2004). By 2013, FDI from developing countries (including transition economies) has accounted for 39% of global FDI outflows (UNCTAD, 2014). It thus seems useful that theoretical framework be established to formalize the comparative advantages of South-based MNEs. This paper aims to make one such contribution.

It has been suggested by a lecture of Dixit (2012) that similarly poor governance endowments may be a source of comparative advantage for South-based MNEs when investing in developing countries. Several empirical studies (Darby et al., 2010; Cuervo-Cazurra and Genc, 2008; Bénassy-Quéré et al., 2007; Habib and Zurawicki, 2002) have found patterns consistent with this hypothesis.[1] In these studies, 'experiences', 'skills' and 'abilities' of firms based in the South 'to manage under difficult conditions' and their 'familiarity' with the norms in the host country are often cited as the potential explanations. Exactly how these comparative advantages arise endogenously is, however, less than fully understood, because often the relative cost advantages of the North and South MNEs have been assumed rather than derived.

In this paper, I propose a theoretical model to micro-found the cost structure of firms, given their

[1] Darby et al. (2010) found that South MNEs are less (or not at all) deterred by bad institutional quality in the host country than North MNE, based on bilateral FDI count data (on the number of MNEs from a country of origin present in a destination country). Cuervo-Cazurra and Genc (2008) measured the proportion of developing-country MNEs among the largest foreign firms in each of 50 LDCs and found that developing-country MNEs are more prevalent in LDCs with poorer regulatory quality and lower control of corruption (although this negative relationship does not apply to all aspects of institutional quality, e.g., rule of law). Bénassy-Quéré et al. (2007), using a gravity model for bilateral FDI from OECD countries to the other countries, found that good institutions in the home country have no or even negative impact on outward FDI, and institutional distance has often a negative impact on bilateral FDI. Last but not least, Habib and Zurawicki (2002) focused on corruption and observed that the distance in the corruption level between the home and host countries reduce bilateral FDI flows.

endogenous response to the state institutions in which they are based and where their production facilities might be. Firms' optimal choice of FDI location, sourcing decision (FDI or domestic production), and production decision (produce or not) are fully characterized, in a vertical-FDI model with many countries, industries, and heterogeneous firms. I arrive at the main hypothesis that predicts an institutional complementarity pattern across countries in bilateral FDI flows at both the firm and country levels.

The theory is built on the fundamental assumption that the fixed operating cost of firms increases with poorer state institutions, but decreases with firms' own investment in *informal institutions*, and the latter decrease is amplified in environments of poorer state institutions. As an endogenous outcome, when and where the formal institutions are weaker, the private sector tends to build more *informal institutions* to substitute the former. There is a vast intellectual literature that documents the endogenous response of the private sector to the formal institutions the state provides. Evidence abounds and we may for the purpose of exposition classify them into economic, legal and political informal institutions. First, where the market-supporting institutions such as contract enforcement and bank credit are lacking, firms tend to fill in the void with relational contracting and trade credit. These patterns are documented for example by McMillan and Woodruff (2002) for Russia, China, Poland and Vietnam. McMillan and Woodruff (1999a,b) provide detailed accounts of how these *informal economic institutions* work in Vietnam under reputation incentives and threat of community sanction. A similar argument is suggested by Acemoglu and Johnson (2005) that reputation-based mechanisms can, at least in part, alleviate the problems originating from weak contracting institutions.

Second, where the state legal institution is weak, the private sector tends to turn to *informal legal institutions* such as private patrols, private protection agencies or informal courts to substitute for police protection and judicial systems (Hay and Shleifer, 1998). For example, Frye and Zhuravskaia (2000) find that higher levels of regulation and weak legal institutions are associated with a higher probability of contact with a private protection organization in Russia.

Finally (and perhaps the most controversial of the three given its many faceted implications), where the state's bureaucratic system is inefficient and regulatory quality poor, firms tend to build political connection (Fisman, 2001; Faccio, 2006) with politicians and government officials, or directly participate in politics. Political connection may help firms reduce regulatory burden (eg.,

fewer days to obtain business permit, fewer agencies to register or fewer on-site inspections) but also secure property rights (eg., lower expropriation via tax or fines) and enforce contracts. For example, Li et al. (2006) found that in China, the probability of entrepreneurs entering politics decreases by 8-20% when the institutional index in a region improves by one standard deviation. Chen et al. (2011) similarly show that firms are more likely to establish political connections in regions in which the government has more discretion in allocating economic resources. Bai et al. (2014) provide a vivid account of how in the aluminum and auto industries, Chinese local governments may have a large leverage in providing public goods (such as land and capital) to their cronies and alter the terms of competition in the market. In general, firms may engage in all three types of informal institutional building (economic, legal or political). For example, Cai et al. (2011) infer that the entertainment and travel costs expenditures of Chinese firms consist of grease money to obtain better government services, protection money to lower tax rates, and also business expenditures to build relational capital with suppliers and clients.[2]

The heavier investment in informal institution by firms based in the South then gives them comparative advantages in conducting FDI in countries of poorer institutional qualities (as the adverse effect of weak institutions at the destination on fixed cost is reduced by the firm-specific institutional investment and more so in destinations of weaker institutions). Thus, a MNE from a country of poorer state institutions than another MNE will tend more likely to invest in a destination of poorer state institutions than the other MNE's choice of destination, all else being equal. I go on to develop the implications on the volume of bilateral FDI flows at the country level, given the firm-level choice of FDI destination across sectors of different market sizes and across firms of heterogeneous productivity levels. The model generates the endogenous presence of zero FDI across some bilateral country relations. Conditional on positive bilateral FDI flows, the institutional complementarity continues to hold at the 'intensive margin': multinational firms will generate more net profits in countries of poorer institutional qualities, the poorer the institutional environment at home. At the 'extensive margin', subject to certain qualifying conditions, more multinational firms will conduct FDI in countries of poorer institutional qualities, the poorer the

[2]The term *informal institution* has been used in the literature to refer to many things ranging from customs, traditions, norms, religion (Williamson, 2000), social capital, trust (Chan et al., 2015) to culture. Here, I adopt the definition of Helmke and Levitsky (2004) that distinguishes informal institution from informal behavioral regularities, shared values and the broader concept of culture. Specifically, informal institutions are defined as socially shared rules, usually unwritten, that are created, communicated, and enforced outside of officially sanctioned channels.

institutional environment at home.

Although the empirical studies I cited earlier have presented evidence, at least in part, supporting the above hypothesis, there are some limitations to these studies. For example, institutional distance are often used as a control variable (except Darby et al., 2010) when the current theory suggests that institutional interaction term should be used. Second, the countries included are often restricted to the least developed countries as the host country (Cuervo-Cazurra and Genc, 2008) or developed countries as the home country (Bénassy-Quéré et al., 2007). Third, when the country coverage is comprehensive, it is often at the cost of using the FDI count data (ie, the number or percentage of firms) instead of the FDI volume data (Darby et al., 2010). In response to these potential critiques, I assemble a dataset on bilateral FDI stocks (and flows) for 219 economies in 2001-2010 based on the UNCTAD's Bilateral FDI Statistics. This extends the country coverage to include almost all economies in the world, which allows us to look into the behavior of FDI flows from (to) the whole spectrum of countries in terms of institutional quality. I measure the institutional quality of countries by the World Bank's Worldwide Governance Indicators commonly used in the literature. I test the theory's main prediction of a positive assortative matching pattern in institutions, by regressing FDI on the level and the interaction of institutional quality indicators of the home and host countries, in addition to many potential FDI determinants suggested by the literature. This includes an extensive set of gravity variables (to control for information barriers or transaction costs), the home and host country characteristics (such as GDPs, GDPs per capita, and general production cost levels), and also variables to control for competing hypotheses. In particular, since income levels and institutional qualities are correlated, the difference in GDPs per capita between the home and host countries is included to control for the Linder effect in FDI proposed by Fajgelbaum et al. (2015).

Overall, I find very robust support for the theory's prediction. The coefficient on the institutional interaction term is positive and significant, and the finding is robust to the FDI series used (inward or outward, stocks or flows), the measure of institutional quality (voice and accountability (VA), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), or control of corruption (CC)), the estimation specification (with or without time-varying home and host country fixed effects), and the inclusion of zero FDI observations.

The strength of the complementarity varies across institution indicators and robustness checks,

but the effects are systematically stronger for GE, RQ and VA, weaker for RL and CC, and the weakest for political stability and absence of violence (PV). This pattern suggests an interesting interpretation of the areas where informal institutions are feasible and prevalent, and where they are not. Informal institutions tend to be built in response to inefficient public services or poor policy formulation/implementation (GE and RQ); these firm-specific investment most likely corresponds to political informal institutions such as political network or connections. To some extent, such political informal institutions may also help firms to maneuver in a society with less government political accountability (VA). On the other hand, economic and legal informal institutions such as relational contracting and private enforcement mechanisms appear more costly for firms to build in response to inefficient contract enforcement or property rights protection (RL and CC). Finally, it appears extremely costly for firms to build legal informal institutions such as private troops to guard against political violence, civil riots or terrorism (PV). To the extent that informal institutions are very costly to build, we will expect to observe weak (or no) complementarity effect in the corresponding institution indicator (as the case of PV demonstrates).

Singapore often ranks among the top in terms of good governance. For example, in 2012, it clinched the 1st in terms of GE and RQ, the 4th in CC, and the 5th in RL. Thus, when its government undertook to jointly develop the China-Singapore Suzhou Industrial Park (SIP) with the Chinese government in 1994, by transplanting its Singapore-style institutions overseas in the Chinese land of cheap labor, it was greeted by the investor community with great enthusiasm. Take a few examples from Pereira (2002):

> *We are a Western multinational company. We operate entirely above board. We don't like hidden costs and personal benefits in business. We came on the basis that there would be a Singaporean system here. We can justify every single entry honestly in our account books. (Manager, European company, male, Germany citizen, aged 40-50)*

> *Things here [at the SIP] are very straightforward. All the rules are clear, all the personnel are very professional, and the estate is very modern. So this has allowed our company to focus on doing business rather than worry about all the other aspects. (Manager, US company, male, Singapore citizen, aged 30-40)*

Few expected that the joint venture would soon 'sour' in 2001. There are no typical barriers

in terms of language, ethnicity, or cultural origins. As the Singaporean leaders later reflected, the Singapore government misjudged the importance of relationship with local authorities. In particular, it underestimated the extent of latitude that the Chinese local officials had versus Beijing in altering the terms of competition (Pereira, 2002). The quotations cited above and the overall incident bring home the point that institutional endowments of an investor (what it is endowed with in formal institutions and what it develops in informal institutions) play a non-negligible role in the operation and outcome of FDI.

The rest of the paper is organized as follows. In Section 2, I develop the theoretical model and predictions. In Section 3, I present the estimation framework and findings. Section 4 discusses potential extensions and concludes.

2 Model

Suppose there are a continuum of countries indexed by $r \in R$, where r is an inverse measure of the quality of formal institutions. The larger r is, the poorer the institution of the country. There are a continuum of sectors indexed by j producing differentiated goods and one sector producing homogeneous good (used as the numeraire). The only factor of production is labor, and the homogeneous good is produced with constant unit labor requirement. I abstract away from any kind of trade frictions in the theory to focus on the effect of institutions on the incentives of vertical FDI, although in the empirical section, I will control for an extensive set of FDI determinants that the literature has proposed. It is assumed that labor endowment is large enough in each country such that the homogeneous good is always produced. The setup implies that a country's labor productivity in the numeraire good determines its wage rate w. It is assumed that $w = \omega(r)$ and $\omega'(r) \equiv d\omega(r)/dr < 0$. In other words, countries with better formal institution have higher labor productivity in the numeraire good, and hence a higher wage.

Each variety of the differentiated goods requires a headquarter service component and a manufactured component using a Cobb-Doublas production function (à la Antràs and Helpman, 2004), where each component has a unit labor requirement equal to one. This implies a unit cost of production equal to $c = w_h^{\eta} w_d^{1-\eta}/\phi$, where ϕ indexes the productivity of the firm producing the variety, η the headquarter intensity in the production, and w_h and w_d the wage rate of the country

where the headquarter and the manufacturing facility of the firm are located, respectively.

The world is populated by a unit measure of consumers with identical preferences: $U = x_0 + \frac{1}{\mu}\int X_j^{\mu} dj,\ 0 < \mu < 1$, where x_0 indicates the consumption of the numeraire good, and X_j a CES function over all available varieties $x_j(i)$ in sector j with an elasticity of substitution σ. I drop the sector index j below for the time being to simplify the notation. Given monopolistic competition, the CES preferences imply the standard pricing and profit function. Each firm charges a constant markup over its marginal cost of production $p(c) = \frac{\sigma}{\sigma-1}c$, sells a quantity of $x(p(c)) = X_j^{\sigma(\mu-1)+1} p(c)^{-\sigma}$ and earns a variable profit:

$$\begin{aligned} \pi &= (p(c) - c)x(p(c)) \\ &= Bc^{1-\sigma} \\ &= B\tilde{\phi}\left(w_h^{\eta} w_d^{1-\eta}\right)^{1-\sigma}, \end{aligned} \tag{1}$$

where $B \equiv \frac{1}{\sigma} X_j^{\sigma(\mu-1)+1} \left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma}$ can be taken as an index of the world market size for the sector (exogenous from the point of view of the individual supplier) and $\tilde{\phi} \equiv \phi^{\sigma-1}$ a transformed index of the firm productivity level.

2.1 Choice of Informal Institution

A firm given its productivity level chooses whether to produce or not. If it chooses to produce both components at home, it incurs a fixed overhead cost $f(r_h, I)$, which depends on: i) the quality of the formal institution where the firm is headquartered and, ii) the informal institution I that the firm invests in. If it chooses to produce the manufactured component in a country different from where it is headquartered, it incurs an additional overhead cost $f(r_d, I)$, which depends on the quality of the formal institution in the country where the production facility is located, and similarly, its choice of informal institutional investment.

It is assumed that $f(r, I)$ strictly increases in r (worse formal institution increases overhead cost), strictly decreases in I (firm-specific informal institutional investment reduces overhead cost), and

$$\frac{\partial}{\partial r}\left(\frac{\partial f(r, I)}{\partial I}\right) < 0, \tag{2}$$

that is, informal institution is more effective in reducing overhead cost in environments of poorer formal institutions. Investing in informal institution, however, costs the firm $k(I)$, which is increasing and convex in I.

A firm chooses I^* that minimizes $F(r_h, I) \equiv f(r_h, I) + k(I)$ if it chooses local production and $I^{FDI,*}$ that minimizes $F^{FDI}(r_h, r_d, I) \equiv f(r_h, I) + f(r_d, I) + k(I)$ if it chooses to undertake FDI. Let $F^*(r_h) \equiv \min_I \{f(r_h, I) + k(I)\}$ and $F^{FDI,*}(r_h, r_d) \equiv \min_I \{f(r_h, I) + f(r_d, I) + k(I)\}$.

Proposition 1 *(i) The investment in informal institution is higher for FDI than for local production: $I^{FDI,*}(r_h, r_d) > I^*(r_h)$; (ii) The total fixed cost of production is higher for FDI than for local production: $F^{FDI,*}(r_h, r_d) > F^*(r_h)$; (iii) The total fixed cost of production is higher in FDI destinations of poorer institutional qualities: $dF^{FDI,*}/dr_d > 0$; (iv) For a given FDI destination, the total fixed cost of production is higher for MNEs based in countries of poorer institutional qualities: $dF^{FDI,*}/dr_h > 0$.*

Proof. (i) $\frac{\partial F^{FDI}}{\partial I}|_{I=I^*} = \frac{\partial f(r_h, I^*)}{\partial I} + \frac{\partial f(r_d, I^*)}{\partial I} + k'(I^*) = \frac{\partial f(r_d, I^*)}{\partial I} < 0$, where the second equality follows by the FOC condition for I^*: $\frac{\partial f(r_h, I^*)}{\partial I} + k'(I^*) = 0$, and the last inequality follows by the assumption that $f(r, I)$ strictly decreases in I. This implies that $I^{FDI,*} > I^*$. (ii) We can write $F^{FDI,*} - F^* = \left\{F^{FDI,*} - F(r_h, I^{FDI,*})\right\} + \left\{F(r_h, I^{FDI,*}) - F^*\right\} > 0$. The inequality holds since $F^{FDI,*} - F(r_h, I^{FDI,*}) = f(r_d, I^{FDI,*}) > 0$ by the setup, and $F(r_h, I^{FDI,*}) - F^* > 0$ by the definition of F^* and the fact that $I^{FDI,*} \neq I^*$. (iii) By the envelope theorem, we have

$$\frac{dF^{FDI,*}}{dr_d} = \frac{\partial f(r_d, I^{FDI,*})}{\partial r_d} > 0 \tag{3}$$

by the assumption that $f(r, I)$ strictly increases in r. (iv) The proof is similar to (iii), by replacing r_d with r_h. ■

Proposition 2 *Multinational firms headquartered in countries of lower institutional quality invests more in informal institution: $\frac{\partial I^{FDI,*}(r_h, r_d)}{\partial r_h} > 0$. As a corollary, multinational firms headquartered in countries of lower institutional quality are more effective at reducing its overhead fixed cost at a given FDI destination: $\frac{df(r_d, I^{FDI,*})}{dr_h} < 0$.*

Proof. Let $f_I(r,I) \equiv \frac{\partial f(r,I)}{\partial I}$ and $f_{II}(r,I) \equiv \frac{\partial^2 f(r,I)}{\partial I^2}$. The FOC for $I^{FDI,*}$ requires that at $I^{FDI,*}$,

$$f_I(r_h,I) + f_I(r_d,I) + k'(I) = 0. \tag{4}$$

Take total differentiation of (4) with respect to r_h and $I^{FDI,*}$, we have

$$\frac{\partial I^{FDI,*}}{\partial r_h} = -\frac{\frac{\partial f_I(r_h,I)}{\partial r_h}}{f_{II}(r_h,I) + f_{II}(r_d,I) + k''(I)} > 0$$

at $I^{FDI,*}$ by the SOC for $I^{FDI,*}$ and the assumption in (2).[3] As a corollary,

$$\frac{df(r_d, I^{FDI,*})}{dr_h} = f_I(r_d, I^{FDI,*})\frac{\partial I^{FDI,*}}{\partial r_h} < 0$$

by the assumption $f_I(r,I) < 0$ and the previous result $\frac{\partial I^{FDI,*}}{\partial r_h} > 0$. ■

The intuition for Proposition 2 is straightforward: the marginal benefit for a firm to invest in informal institution is higher if it is based in a country of poorer institutions, because the informal institution is more useful in environments where the formal institution is lacking, by reducing the fixed overhead cost of the headquarter operation. The heavier investment in informal institution in turn enables these firms to reduce by more the overhead production cost at the FDI destination. Thus, for given FDI destination r_d, although South-based MNEs (MNEs based in countries with poorer state institutions r_h) have a higher total fixed cost of operation $F^{FDI,*}$ due to their home institutional disadvantage and the higher cost incurred to build I, they actually have a lower fixed cost of production $f(r_d,I)$ at the FDI destination.

2.2 Optimal FDI Destination

Having characterized the endogenous choice of informal institution by firms for given (r_h, r_d), I now characterize their optimal choice of FDI destination (r_d). If a firm chooses to produce locally, its net profit is

$$\Pi^D \equiv \pi^D - F^*(r_h) = B\tilde{\phi}\,(w_h)^{1-\sigma} - F^*(r_h), \tag{5}$$

[3] I impose the necessary condition on $f_{II}(r,I)$ to ensure that the SOC, $f_{II}(r_h,I) + f_{II}(r_d,I) + k''(I) > 0$, is satisfied. Given the convexity of $k(I)$, a sufficient condition is $f_{II}(r,I) > 0$.

which increases in $\tilde{\phi}$ linearly. Note that $F^*(r_h)$ has taken into account the optimal choice I^* given the home institutional environment r_h. If a firm chooses to undertake FDI, its net profit is instead

$$\Pi^{FDI} = \pi^{FDI} - F^{FDI,*}(r_h, r_d) = B\tilde{\phi}\left(w_h^{\eta} w_d^{1-\eta}\right)^{1-\sigma} - F^{FDI,*}(r_h, r_d), \tag{6}$$

where again $F^{FDI,*}(r_h, r_d)$ has taken into account the optimal choice $I^{FDI,*}$ for given destination r_d and the MNE's home condition r_h. In the current setting, since the fixed cost of production for FDI is higher than local production by Proposition 1(ii), if firms choose FDI, they necessarily choose a destination with $r_d > r_h$ (such that $w_d < w_h$) that generates a higher variable profit. This is in line with most vertical-FDI models driven by differences in production cost across countries. Of course, we do not expect this to hold unconditionally in the data when FDI may be driven by various other incentives.

Among possible destinations of FDI, firms trade off lower wages in countries of poorer institutions with higher fixed costs, and choose r_d that maximizes (6). The FOC for the optimal choice r_d^* requires that at r_d^*:

$$\frac{\partial \pi^{FDI}}{\partial w_d}\omega'(r_d) - \frac{\partial f(r_d, I^{FDI,*})}{\partial r_d} = 0, \tag{7}$$

where I have applied the envelope theorem to $F^{FDI,*}(r_h, r_d)$. This defines the optimal choice of the FDI destination r_d^* as an implicit function of the firm, industry and home country characteristics: $r_d^* \equiv H(r_h, \tilde{\phi}, B, \eta)$, including the home institution r_h, the firm productivity level $\tilde{\phi}$, the world demand for the sector B, and the headquarter intensity of the industry η.

Proposition 3 *(i)* **(Complementarity in Institutional Qualities)** *All else being equal, a firm will choose to undertake FDI in countries of poorer institutional qualities, the poorer the institutional quality at home:* $\frac{\partial r_d^*}{\partial r_h} > 0$*; (ii) All else being equal, a firm will choose to undertake FDI in countries of poorer institutional qualities, the more productive the firm is:* $\frac{\partial r_d^*}{\partial \tilde{\phi}} > 0$*; (iii) All else being equal, a firm will choose to undertake FDI in countries of poorer institutional qualities, the larger the world demand for the sector is:* $\frac{\partial r_d^*}{\partial B} > 0$*; (iv) All else being equal, a firm will choose to undertake FDI in countries of poorer institutional qualities, the less headquarter-intensive the sector is:* $\frac{\partial r_d^*}{\partial \eta} < 0$.

Proof. (i) Totally differentiate (7) with respect to r_d^* and r_h, we obtain

$$\frac{\partial r_d^*}{\partial r_h} = -\frac{\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial w_h}\omega'(r_d)\omega'(r_h) - \frac{\partial^2 f}{\partial I \partial r_d}\frac{\partial I^{FDI,*}(r_h,r_d)}{\partial r_h}}{\frac{\partial^2 \Pi^{FDI}}{\partial r_d^2}} > 0. \tag{8}$$

The inequality holds since $\frac{\partial^2 \Pi^{FDI}}{\partial r_d^2} < 0$ by the SOC for r_d^*, and the numerator is positive by the facts that: (a) $\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial w_h} = \eta(1-\eta)(1-\sigma)^2 \pi^{FDI}/(w_h w_d) > 0$ and $\omega'(r) < 0$ and (b) $\frac{\partial^2 f}{\partial I \partial r_d} < 0$ by the assumption in (2) and $\frac{\partial I^{FDI,*}(r_h,r_d)}{\partial r_h} > 0$ by Proposition 2.[4]

(ii) Similarly, taking total differentiation of (7) with respect to r_d^* and $\tilde{\phi}$, we have

$$\frac{\partial r_d^*}{\partial \tilde{\phi}} = -\frac{\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial \tilde{\phi}}\omega'(r_d)}{\frac{\partial^2 \Pi^{FDI}}{\partial r_d^2}} > 0, \tag{9}$$

because $\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial \tilde{\phi}} = (1-\eta)(1-\sigma)\pi^{FDI}/(w_d \tilde{\phi}) < 0$ and $\omega'(r) < 0$.

(iii) It is straightforward to see that B has an analogous (positive) effect as $\tilde{\phi}$ on r_d^*, because B and $\tilde{\phi}$ enter π^{FDI} multiplicatively.

(iv) Finally, by similar derivations, we have

$$\frac{\partial r_d^*}{\partial \eta} = -\frac{\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial \eta}\omega'(r_d)}{\frac{\partial^2 \Pi^{FDI}}{\partial r_d^2}} < 0,$$

where $\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial \eta} = (1-\sigma)\left[(1-\eta)(1-\sigma)\ln\frac{w_h}{w_d} - 1\right]\pi^{FDI}/w_d > 0$, since $w_h > w_d$ ($r_d > r_h$) holds at the optimal choice of destination. ■

Institutional complementarity across the source and destination countries of bilateral FDI flows arises for two reasons. First, firms based in countries of poorer institutional qualities tend to be more heavily endowed with firm-specific informal institutions, which gives them a comparative advantage in conducting FDI in countries of poorer institutional qualities (as the adverse effect of weak institutions at the destination on fixed cost is reduced by the firm-specific institutional investment, and more so in destinations of poorer institutions). This is the main mechanism I wish to highlight in this paper. In addition, given the supermodularity between the headquarter and the intermediate component implied by the Cobb-Douglas production function, a lower wage at

[4] I make the necessary assumptions on $\omega''(r)$ and $\frac{\partial^2 f(r,I)}{\partial r^2}$ to ensure that the SOC, $\frac{\partial^2 \Pi^{FDI}}{\partial r_d^2} < 0$, for r_d^* is satisfied.

home (a lower-cost headquarter input) also increases the marginal benefit (increments in variable profits) of securing a lower-cost manufactured component. This second mechanism reinforces the main mechanism and strengthens the complementarity effect in institutions.

A larger $\tilde{\phi}$ or B increases the marginal benefit of having a lower wage w_d at the FDI destination, since the market share (or size) at stake is larger. This encourages the firm to take on higher fixed costs associated with investing in countries of poorer institutional qualities so as to access the cheaper labor pool in these destinations. In contrast, when a sector is more headquarter intensive, the cost of the manufactured component becomes less a concern, which weakens the incentive to locate FDI in countries with weaker institutional support.

2.3 Sorting of Firms

The result of Proposition 3(ii) (that more productive firms choose FDI in countries of poorer institutions) implies that the net profit function of FDI is an increasing and convex function of firm productivity level $\tilde{\phi}$ for a given sector and home country. To see this, define

$$\Pi^{FDI,**} \equiv \max_{r_d} \left\{ \pi^{FDI}(r_h, r_d, \tilde{\phi}, B, \eta) - F^{FDI,*}(r_h, r_d) \right\}$$

and $\pi^{FDI,**}$ and $F^{FDI,**}$ the corresponding variable profit and fixed cost given the optimal choice of destination r_d^*. Applying the envelope theorem, we have

$$\begin{aligned} \frac{d\Pi^{FDI,**}}{d\tilde{\phi}} &= \frac{\partial \pi^{FDI,**}}{\partial \tilde{\phi}} = B(w_h^{\eta} w_d^{1-\eta})^{1-\sigma} > 0; \\ \frac{d^2\Pi^{FDI,**}}{d\tilde{\phi}^2} &= (1-\eta)(1-\sigma) w_d^{-1} B(w_h^{\eta} w_d^{1-\eta})^{1-\sigma} \omega'(r_d^*) \frac{\partial r_d^*}{\partial \tilde{\phi}} > 0, \end{aligned}$$

where the sign for the second derivative follows by Proposition 3(ii). In addition, by Proposition 1(iii) and Proposition 3(ii) again, we have

$$\frac{dF^{FDI,**}}{d\tilde{\phi}} = \frac{dF^{FDI,**}}{dr_d^*} \frac{dr_d^*}{d\tilde{\phi}} > 0.$$

Thus, as more productive firms choose FDI in countries of higher r_d, they earn a higher variable profit margin but also incur a higher fixed cost. This is illustrated in Figure 1 by firms of three

representative productivity levels $\tilde{\phi}_1 < \tilde{\phi}_2 < \tilde{\phi}_3$. Their respective choice of r_d (with $r_{d,1} < r_{d,2} < r_{d,3}$) implies increasingly steeper variable profit margins and higher fixed costs. The net profit function $\Pi^{FDI,**}$ corresponds to the upper contour of net profit functions across the continuum of FDI destinations.

The profit function of producing locally and that of FDI are juxtaposed in Figure 2. Given a convex profit function $\Pi^{FDI,**}$ for FDI but a linear one for local production, and a higher fixed cost for FDI than local production (Proposition 1(ii)), there exists a productivity level $\tilde{\phi}^{FDI}$ at which firms are indifferent between FDI and local production ($\Pi^{FDI,**} = \Pi^{D}$). Let $\tilde{\phi}^{D}$ denote the productivity cutoff level for local firms to break even. I assume $\Pi^{FDI,**}(\tilde{\phi}^{D}) < 0$ such that firms are sorted into local firms and multinational firms. Specifically, firms with $\tilde{\phi} \in [\tilde{\phi}_{\min}, \tilde{\phi}^{D}]$ will choose not to produce and exit the industry, firms with $\tilde{\phi} \in [\tilde{\phi}^{D}, \tilde{\phi}^{FDI}]$ will produce locally, and firms with $\tilde{\phi} \in [\tilde{\phi}^{FDI}, \tilde{\phi}_{\max}]$ will undertake FDI. The cutoffs are defined implicitly by:

$$B\tilde{\phi}^{D}\omega(r_h)^{1-\sigma} = F^{*}(r_h); \tag{10}$$

$$B\tilde{\phi}^{FDI}\left[\omega(r_h)^{\eta}\omega(r_d(\tilde{\phi}^{FDI}))^{1-\eta}\right]^{1-\sigma} - B\tilde{\phi}^{FDI}\omega(r_h)^{1-\sigma} = F^{FDI,*}(r_h, r_d(\tilde{\phi}^{FDI})) - F^{*}(r_h). \tag{11}$$

The sorting condition $\Pi^{FDI,**}(\tilde{\phi}^{D}) < 0$ can be rewritten as: $\left(\frac{\omega(r_h)}{\omega(r_d(\tilde{\phi}^{D}))}\right)^{(1-\eta)(\sigma-1)} < \frac{F^{FDI,*}(r_h, r_d(\tilde{\phi}^{D}))}{F^{*}(r_h)}$, that is, the extra fixed cost of FDI should dominate the wage advantage FDI offers from the perspective of the least productive surviving firms (given its endogenous choice of r_d). I assume that this is the case since sorting of firms by productivity levels into domestic and multinational ones is well documented by empirical studies.

2.4 Aggregate Bilateral FDI

To arrive at an expression for aggregate bilateral FDI at the country level, I impose some further structures on the model. I suppose that the sectoral-level demand has a uniform distribution such that $B \sim \mathcal{U}(0, 1)$. For simplicity, I suppose that sectors are homogeneous in terms of headquarter intensity. Finally, I assume that firm productivity levels in each sector follow a cumulative density function $G(\tilde{\phi})$ with support $\tilde{\phi} \in [1, \infty)$.

For illustrative purposes, focus on a particular destination r_d^o. For a given home country r_h and sector B, this pins down the firm productivity level $\tilde{\phi}^{o}$ that will prefer r_d^o among all possible

FDI destinations r_d. Specifically, the FOC for r_d^* in (7) requires that $B\tilde{\phi}^o = C(r_h, r_d^o)$, where $C(r_h, r_d) \equiv \left\{ w_h^{\eta(1-\sigma)} w_d^{(1-\eta)(1-\sigma)-1} (1-\eta)(1-\sigma)\omega'(r_d) \right\}^{-1} \frac{\partial f(r_d, I^{FDI,*})}{\partial r_d}$ is a constant given the home and host institutional conditions r_h and r_d. Thus, the lower the sectoral demand B, the higher the corresponding productivity level of the firm that would prefer r_d^o. More formally, we have $d\tilde{\phi}^o/dB = -\tilde{\phi}^o/B$.

Whether the firm indeed undertakes FDI in r_d^o, however, depends on whether the firm productivity level $\tilde{\phi}^o$ exceeds the threshold $\tilde{\phi}^{FDI}$ for FDI. If this is not the case, the FDI profit $\Pi^{FDI,**}$ falls short of domestic profit Π^D and FDI will not realize. Using the cutoff condition for FDI (11), we can similarly derive the effect of the sectoral demand B on the cutoff productivity $\tilde{\phi}^{FDI}$. In particular, take total differentiation of (11) with respect to B and $\tilde{\phi}^{FDI}$, applying the FOC (7), we have $d\tilde{\phi}^{FDI}/dB = -\tilde{\phi}^{FDI}/B$. Thus, the lower the sectoral demand, the higher the productivity cutoff for FDI.

Given the similar unit elasticity in the response of $\tilde{\phi}^o$ and $\tilde{\phi}^{FDI}$ to the sectoral demand level B, we can summarize the bilateral FDI flows across sectors in a simple manner. Starting with the highest sectoral demand level $B = 1$, label the corresponding productivity level in this sector that would prefer r_d^o to the other FDI locations as $\underline{\tilde{\phi}^o}$ and the FDI cutoff level in this sector as $\underline{\tilde{\phi}^{FDI}}$. It turns out that there are only two possible scenarios.

2.4.1 zero bilateral FDI

In the first scenario, suppose $\underline{\tilde{\phi}^o} < \underline{\tilde{\phi}^{FDI}}$. There would be no FDI in r_d^o from r_h in this sector. As we look across sectors with lower B, since

$$\left| d\tilde{\phi}^o/dB \right| = \left| -\tilde{\phi}^o/B \right| < \left| -\tilde{\phi}^{FDI}/B \right| = \left| d\tilde{\phi}^{FDI}/dB \right|, \tag{12}$$

$\tilde{\phi}^o$ rises by less than $\tilde{\phi}^{FDI}$. As a result, the firm who might prefer r_d^o as a possible FDI destination in a sector always finds domestic production preferable to FDI. Thus, there would be no FDI in r_d^o from r_h for all $B \in [0, 1]$. The bilateral FDI from r_h in r_d^o in this case is zero.

2.4.2 positive bilateral FDI

On the other hand, suppose $\underline{\tilde{\phi}}^o > \underline{\tilde{\phi}}^{FDI}$. Then, FDI takes place from r_h in r_d^o in the sector with the largest demand. As the demand B decreases across sectors, we have

$$\left|d\tilde{\phi}^o/dB\right| = \left|-\tilde{\phi}^o/B\right| > \left|-\tilde{\phi}^{FDI}/B\right| = \left|d\tilde{\phi}^{FDI}/dB\right|; \tag{13}$$

thus $\tilde{\phi}^o$ will increase faster than $\tilde{\phi}^{FDI}$. As a result, firms who might choose r_d^o as a potential FDI destination also find FDI more profitable relative to domestic production for all $B \in [0,1]$. In this case, there is positive bilateral FDI from r_h in r_d^o.

Given that B has a uniform distribution, and that the firm productivity distribution is the same across sectors, the bilateral FDI activity from country r_h in r_d^o measured by net profit is given by:

$$\begin{aligned} V(r_h, r_d^o) &\equiv \int_{\underline{\tilde{\phi}}^o}^{\infty} \left(B\tilde{\phi}^o \left(w_h^\eta \, \omega (r_d^o)^{1-\eta} \right)^{1-\sigma} - F^{FDI,*}(r_h, r_d^o) \right) dG(\tilde{\phi}^o) \\ &= \left(C(r_h, r_d^o) \left(w_h^\eta \, \omega (r_d^o)^{1-\eta} \right)^{1-\sigma} - F^{FDI,*}(r_h, r_d^o) \right) \left(1 - G(\underline{\tilde{\phi}}^o) \right), \end{aligned} \tag{14}$$

where recall that $\underline{\tilde{\phi}}^o = C(r_h, r_d^o)$ corresponds to the firm that chooses r_d^o in the sector with the highest level of demand ($B = 1$). As B decreases toward zero across sectors, the corresponding productivity level of the firm that chooses r_d^o increases toward infinity.

We may interpret the first term in (14) as reflecting the 'intensive margin' and the second term the 'extensive margin' of FDI activity. They correspond, respectively, to the average net FDI profit per firm and the mass of firms conducting FDI from country r_h in country r_d^o, conditional on positive bilateral FDI flows.[5] The intensive margin of FDI turns out to inherit the same institutional complementarity mechanism as shown for individual firms in Proposition 3(i), with similar intuitions. To see this, note that $\frac{\partial \Pi^{FDI}}{\partial r_d \partial r_h}$ corresponds to the numerator of (8), which is shown to be positive for arbitrary combinations of $(r_h, r_d, \tilde{\phi}, B, \eta)$. But this includes the particular combinations that satisfy the FOC (7) and where $r_d^* = r_d^o$, ie., when Π^{FDI} corresponds to the first term in (14).

[5]The intensive and extensive margins are defined here conditional on positive bilateral FDI flows. This is not exactly the same as how these two margins are sometimes used in the literature. For example, some studies in the trade literature define the extensive margin by the proportion of active trade status among the universe of country-pairs, sectors, or product groups.

To derive the effect of institutional quality on the extensive margin of FDI, first note that

$$\frac{\partial\left(1-G(\underline{\tilde{\phi}}^o)\right)}{\partial r_h} = -g(\underline{\tilde{\phi}}^o)\underbrace{\frac{\partial \underline{\tilde{\phi}}^o}{\partial r_h}}_{(-)} > 0, \tag{15}$$

where $g(\tilde{\phi}) \equiv dG/d\tilde{\phi}$ and $\frac{\partial \underline{\tilde{\phi}}^o}{\partial r_h} < 0$.[6] This implies that conditional on positive bilateral FDI, home countries with poorer institutions have a lower productivity threshold across sectors, and thus a larger mass of firms, to invest in a given destination r_d^o. This implication albeit strong is intuitive, as the higher informal institutional investment made by firms in the South relaxes the constraint (imposed by fixed cost) and allows less productive firms than their peers from the North to survive in a given FDI destination.

The next question to ask is whether this advantage of the South at the extensive margin is stronger in destinations with poorer institutions. For this, we obtain

$$\frac{\partial^2\left(1-G(\underline{\tilde{\phi}}^o)\right)}{\partial r_d^o \partial r_h} = -g(\underline{\tilde{\phi}}^o)\underbrace{\frac{\partial^2 \underline{\tilde{\phi}}^o}{\partial r_d^o \partial r_h}}_{(-)} - g'(\underline{\tilde{\phi}}^o)\underbrace{\frac{\partial \underline{\tilde{\phi}}^o}{\partial r_h}}_{(-)}\underbrace{\frac{\partial \underline{\tilde{\phi}}^o}{\partial r_d^o}}_{(+)}, \tag{17}$$

where $g'(\tilde{\phi}) \equiv dg/d\tilde{\phi}$. The first component in (17) asks whether the decrease in the productivity cutoff (with a higher r_h) will be steeper in destinations of higher r_d and thus exerting a complementarity effect at the extensive margin. The answer is a qualified yes. To show this, use the result in (9) setting $B = 1$ and replace $\tilde{\phi}$ with $\underline{\tilde{\phi}}^o$, we have

$$\frac{\partial \underline{\tilde{\phi}}^o}{\partial r_d^o} = -\frac{\frac{\partial^2 \Pi^{FDI}}{\partial (r_d^o)^2}}{(1-\eta)(1-\sigma) w_h^{\eta(1-\sigma)} w_d^{(1-\eta)(1-\sigma)-1} \omega'(r_d^o)} > 0, \tag{18}$$

where the numerator is negative by the SOC for the optimal choice of FDI destination r_d^* $(= r_d^o)$ and the denominator is positive. The intuition is as suggested by Proposition 3(ii) that more productive

[6] To see this, use Proposition 3(i) and 3(ii), and apply it to the case where $B = 1$ (so $\tilde{\phi}$ reduces to $\underline{\tilde{\phi}}$). Since both r_h and $\tilde{\phi}$ raise the optimal choice of r_d, the two must move in opposite directions holding the destination r_d^o constant. More formally, taking total differentiation of (7) with respect to r_h and $\tilde{\phi}$, setting $dr_d = 0$, we have

$$\frac{\partial \underline{\tilde{\phi}}^o}{\partial r_h} = -\frac{\frac{\partial^2 \pi^{FDI}}{\partial w_d \partial w_h}\omega'(r_d^o)\omega'(r_h) - \frac{\partial^2 f}{\partial I \partial r_d}\frac{\partial I^{FDI,*}(r_h, r_d^o)}{\partial r_h}}{(1-\eta)(1-\sigma) w_h^{\eta(1-\sigma)} w_d^{(1-\eta)(1-\sigma)-1} \omega'(r_d^o)} < 0, \tag{16}$$

where both the numerator and the denominator are positive as shown in the proof of (8) and (9).

firms will choose destinations with higher wage advantages (or higher r_d). Thus, a destination of higher r_d will attract on average more productive firms across sectors to invest in the destination (implying a higher productivity cutoff). Note that the denominator in (18) increases in r_h. On the other hand, the derivative of the numerator with respect to r_h involves third-order derivatives of Π^{FDI} (with respect to r_d^2 and r_h), which cannot be signed. Suppose we can safely ignore the higher-order changes in the numerator as r_h changes; then, the effect of r_h on the denominator in (18) implies that $\frac{\partial^2 \tilde{\phi}^o}{\partial r_d^o \partial r_h} < 0$. Thus, on second-order approximations, the first component in (17) is positive, imposing a complementarity effect at the extensive margin.

The second component in (17) suggests, however, a potential countervailing force, via the effect of r_d^o in (15) on the density function at the margin. This magnitude depends on the cutoff level $\underline{\tilde{\phi}}^o$ and the curvature of the productivity distribution $g'(\cdot)$. If $g'(\underline{\tilde{\phi}}^o)$ is positive, we have an unambiguous positive complementarity effect, reinforcing the first component in (17). The intuition is: as r_d^o increases and $g'(\underline{\tilde{\phi}}^o) > 0$, the effect in (15) is stronger as we are evaluating it at a productivity level where the mass of firms is larger; the reverse is true if $g'(\underline{\tilde{\phi}}^o) < 0$ holds. Overall, the complementarity effect in institutions will hold at the extensive margin if $g'(\cdot)$ is not too negative such that the first positive component in (17) dominates.

Proposition 4 (Complementarity in Institutional Qualities at the Aggregate) *Conditional on positive bilateral FDI: (i) At the intensive margin, bilateral FDI activity at the country aggregate level exhibits complementarity in institutional qualities: multinational firms generate more net profits in countries of poorer institutional qualities, the poorer the institutional environment at home; (ii) At the extensive margin, bilateral FDI activity may exhibit complementarity in institutional qualities (subject to certain qualifying conditions): more multinational firms conduct FDI in countries of poorer institutional qualities, the poorer the institutional environment at home.*

2.5 Discussions of the Model

In the model, I have implicitly assumed that labor productivity is the same across countries in the production of intermediate (headquarter or manufactured) components for differentiated goods. We can relax this assumption without affecting the result, as long as the wage rate adjusted for labor productivity is lower in countries of poorer institutional qualities.

For modeling simplicity, I have also assumed that informal institutional endowment is fully transnational (i.e., equally effective in combatting weak formal institutions in foreign countries as at home). Admittedly, the informal institution built likely cannot be fully transferred across countries. In alternative setups, we may allow firms to build local informal institutions at home and in the host country separately. The main result will continue to hold, so long as the level of informal institution that a firm can build in the host country is constrained by its home institutional environment.

Thirdly, in deriving the aggregate bilateral FDI, I have assumed the firm productivity support to be unbounded. We may instead impose some upper bound on the productivity support (à la Helpman et al., 2008). This will not affect the zero FDI conclusion in the first scenario (Section 2.4.1) but will introduce additional incidence of zero FDI in the second scenario (Section 2.4.2). Zero FDI in this case will occur not only at the bilateral country level but also at the sectoral level. In particular, let $\bar{\bar{\phi}}$ be the upper bound of the firm productivity support. Define $b \equiv C(r_h, r_d^o)/\bar{\bar{\phi}}$, ie., b is the cutoff on the sectoral demand level where the most productive firm would undertake FDI in r_d^o from r_h. For $B < b$, the required productivity level for a firm to choose r_d^o exceeds the upper bound of the productivity support. Thus, FDI will occur only in sectors of sufficiently large demand with $B \in [b, 1]$ for given r_h and r_d^o. In case where $b > 1$, we have zero FDI from r_h in r_d^o, as $\tilde{\phi}^o$ exceeds $\bar{\bar{\phi}}$ in all sectors.

Fourth, in the literature, several studies have suggested that larger firms tend to be more politically connected or politically active (Hellman et al., 2003; Faccio, 2006; Li et al., 2006; Chen et al., 2011). In the current setup, domestic firms do not differ in their choices of I. However, conditional on firms making the cutoff for FDI, more productive MNEs will choose FDI destinations of higher r_d, as shown by Proposition 3. It is straightforward to show that the informal institution a MNE chooses to develop will increase with r_d. Given that more productive firms are also larger in the current model, this establishes a positive correlation between firm size and firm-specific investment in informal institutions.

Finally, in the empirical exercises that follow, I do not observe the cost structure or profit of MNEs but bilateral FDI flows or stocks across countries at the aggregate. As an attempt to bridge the theory and the empirics, we may suppose that the amount of investment that each firm is willing to make is proportional to the expected net profit of FDI (the first term in (14)); thus,

the larger the expected net profit of FDI, the larger the amount of FDI flows per project (firm). Second, we may think of the mass of firms (the second term in (14)) as the number of FDI projects that will be undertaken. Thus, the larger the amount of aggregate bilateral FDI profit expected, the larger the amount of aggregate bilateral FDI flows. This establishes a one-to-one mapping from the former theoretical concept to the latter empirical measure of FDI.

3 Empirical Evidence

Proposition 3(i) suggests that all else being equal, a MNE from a country with poorer institutional quality than another MNE, will tend more likely to invest in a destination with poorer institutional quality than the other MNE's choice of destination. Proposition 4 suggests that this complementarity effect will also hold at the aggregate country level (subject to certain qualifying conditions). I estimate the bilateral FDI volume at the aggregate using the following gravity equation:

$$\begin{aligned}\ln(FDI_{dht}) &= \beta_0 + \beta_1 \ln(gdp_{d,t-1}) + \beta_2 \ln(gdp_{h,t-1}) + \beta_3 \ln(gdppc_{d,t-1}) + \beta_4 \ln(gdppc_{h,t-1}) \\ &\quad + \beta_5 |\ln(gdppc_{d,t-1}) - \ln(gdppc_{h,t-1})| + \beta_6 \ln(p_{d,t-1}) + \beta_7 \ln(p_{h,t-1}) \\ &\quad + \boldsymbol{\beta_8 G_{d,t-1} + \beta_9 G_{h,t-1} + \beta_{10}(G_{d,t-1} * G_{h,t-1})} + \gamma X_{dh,t-1} + \epsilon_{dht}, \qquad (19)\end{aligned}$$

where FDI_{dht} denotes FDI in country d from country h in year t. In particular, the institutional qualities of both the home ($G_{h,t-1}$) and destination ($G_{d,t-1}$) countries and their interaction term ($G_{d,t-1} * G_{h,t-1}$) are included as part of the FDI determinants. Propositions 3(i) and 4 imply a relational matching pattern in FDI in terms of institutions. Thus, a positive sign of β_{10} will provide support for these hypotheses. On the other hand, an insignificant β_{10} would invalidate these hypotheses, as in this case, the home or destination institution has a uniform impact on FDI regardless of the partner country's institutional conditions.

In developing the theoretical model, I have abstracted away from many potentially important determinants of FDI suggested by the literature. I control for them empirically in (19). This includes the economic size of the home and host countries (measured by their gross domestic products, $gdp_{d,t-1}$ and $gdp_{h,t-1}$), the income level of the two countries (measured by their GDPs per capita, $gdppc_{d,t-1}$ and $gdppc_{h,t-1}$), and the business operating costs of the two countries (measured

by their general price levels, $p_{d,t-1}$ and $p_{h,t-1}$). See Globerman and Shapiro (2002) for a literature survey of how these variables may (or may not) affect FDI. I also include a long list of bilateral variables $X_{dh,t-1}$ typically used in the gravity literature to control for transaction and information barriers: distance, contiguity, common language, colonial relationship, regional trade agreement (RTA), and currency union (CU). To this list I add bilateral investment treaty (BIT), as in the context of FDI, the presence of BIT may affect the fixed cost of FDI and its pattern as a result.

A recent study by Fajgelbaum et al. (2015) proposes a Linder hypothesis for FDI. This theory suggests that MNEs will tend to invest in countries of similar income per capita, due to non-homothetic preferences and the proximity-versus-concentration tradeoff in serving foreign markets. This mechanism is controlled for by including the absolute value of the difference in log-per capita income between the home and host countries $|\ln(gdppc_{d,t-1}) - \ln(gdppc_{h,t-1})|$ as in their study. Thus, the institutional complementarity effect presented below is independent of any potential Linder effect due to income similarity.

3.1 Data and Measurement

The FDI data are sourced from the UNCTAD's Bilateral FDI Statistics, which consists of 206 economies reporting their FDI inward stock, outward stock, inward flows, and outward flows (in current US dollars) from and to each of the partner countries during year 2001-2010. The set of partner countries ever recorded includes 193 economies, 13 of them not in the set of reporters. To my knowledge, this dataset is the most comprehensive in terms of country coverage on bilateral FDI flows: including poor and institutionally weak countries as FDI source or destination countries.[7] This is an advantage for this study, as it allows me to incorporate the less investigated spectrum of South-South FDI.

In this dataset, the inward FDI series reported by the recipient country d (from h) is not necessarily equal to the outward FDI series reported by the origin country h (to d). Given this, I do not attempt to gauge or correct the measurement errors, but instead choose to measure FDI_{dht} alternately based on each of the four series reported and look for a robust pattern across the series.

I measure a country's institutional quality based on the Worldwide Governance Indicators (WGI), 2013 Update, in six dimensions: voice and accountability (VA), political stability and ab-

[7] http://unctad.org/en/Pages/DIAE/FDI%20Statistics/FDI-Statistics-Bilateral.aspx

sence of violence (PV), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), and control of corruption (CC).[8] Details on the construction of these indicators can be found in Kaufmann et al. (2010). Since these indicators are highly correlated with one another, I include them one at a time in the estimation of (19). For each governance indicator, a country receives both a point estimate ranging from approximately -2.5 (weak) to 2.5 (strong), and a percentile ranking among all countries. The higher the index, the better the institutional quality. I report the results based on the point estimate, although the results are qualitatively similar based on the percentile ranking.

The data on GDP and GDP per capita (in current US dollars) are based on the World Development Indicators.[9] I then construct the general price level of a country relative to the United States by the ratio of its GDP (per capita) in current US dollars to its GDP (per capita) in current PPP dollars. This variable aims to capture the overall cost of production (including, e.g., rent, wages, intermediate materials and infrastructure) facing the firms operating in the country.

The transaction and information cost proxies $X_{dh,t-1}$ are compiled from several sources. The CEPII website provides the data on bilateral distance, and whether two countries are contiguous (*contig*), share a common language (*comlang*), have ever had a colonial link (*colony*), have had a common colonizer after 1945 (*comcol*), are currently in a colonial relationship (*curcol*) or were/are the same country (*smctry*).[10] The data on whether two countries are currently in a regional trade agreement (*rta* for 1958-2014), and whether they use a common currency (*comcur* for 1948-2009) are retrieved from de Sousa's website.[11] Last but not least, the data on bilateral investment treaties are obtained from UNCTAD. I construct a dummy variable that equals one if a BIT is currently in force between a country pair and zero otherwise, according to the date a BIT enters into force (and the date it is terminated if ever).[12]

[8] http://data.worldbank.org/data-catalog/worldwide-governance-indicators.

[9] http://data.worldbank.org/data-catalog/world-development-indicators (22-Jul-2014 update).

[10] http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6. See Mayer and Zignago (2011) for further details. I corrected some coding errors of *smctry* in the original data, wherever they were not symmetric for the same country pair *dh* and *hd* based on the information in http://www.worldstatesmen.org/, which is the same source used by the original data to create the variable. Details on the entries corrected are available upon request.

[11] http://jdesousa.univ.free.fr/data.htm. See also de Sousa (2012).

[12] The data were retrieved from the UNCTAD website in June 2013. The interface has since been migrated to http://investmentpolicyhub.unctad.org/IIA. I corrected the original data downloaded in cases where BIT entries on one side are missing or where the dates of entry into force are inconsistent between two BIT partner countries. The corrections are made based on the updated information provided in the above website. I set the cutoff date to be July 1st of the current year in defining the year-varying *bit* dummy.

All regressors (if time variant) are lagged one period relative to the FDI variable, to reduce the concern of reverse causality. I also experiment using longer lags of the right-hand-side variables in unreported exercises, but the results are similar.

In sum, the study covers bilateral FDI stocks (flows) for 219 economies in 2001-2010, with attrition in the sample size due to missing entries or gaps in the data. The effective sample size varies, depending on the FDI series used and the estimation specification studied.[13]

3.2 Results

Table 1 presents the OLS estimation result of (19) for FDI inward stock reported by the recipient country. As shown by the table, the coefficient on $(G_d * G_h)$ is positive and significant regardless of the indicators used to measure institutional quality, supporting the paper's theoretical prediction. The Linder hypothesis of Fajgelbaum et al. (2015) is also supported overall by the data.

Most of the other coefficients are precisely estimated and consistent with ex ante theoretical predictions. A larger home or host market size, a lower production cost at the destination and a higher production cost at home, physical proximity, common language, colonial relationship, and currency union all help raise bilateral FDI stock.

Regional trade agreements and bilateral investment treaties do not have robust positive effects on bilateral FDI. In fact, ironically, BIT is shown to have a negative (and statistically significant) effect on inward FDI stock. This result, however, is not robust to variations in estimation specifications as will be discussed later.

Table 2 summarizes the results when the FDI outward stock, inflows, or outflows are used instead to measure the FDI activity. The sign of the coefficient on $(G_d * G_h)$ is significantly positive and amazingly robust across all FDI series and institution indicators (except perhaps PV). The Linder hypothesis of Fajgelbaum et al. (2015) receives empirical support from data on FDI stocks, but not in terms of FDI flows.

I take the strength of the complementarity in institutions as reflecting the possibility for firms to build firm-specific informal institutions to reduce fixed overhead costs of FDI. The strongest

[13]The whole set of 219 economies consists of 206 reporting countries and 13 partner countries that did not appear as reporting countries. Gaps in the data, for example, occur in the governance indicators, which are not available for year 2001. Missing data arise mainly due to the dependent variable, although different country coverage across data sources leads to missing data on the independent variables as well.

complementarity is observed for RQ and weakest for PV in Table 2. This suggests that firms 'born' in countries of weak regulatory quality may find it easier to build informal institutions such as political network to deal with red tapes than firms born in politically unstable and violence-prone countries to build informal institutions such as private security forces to deal with civil riots, terrorism, or wars. To the extent that such informal institutions are too costly, we will expect to observe weak (or no) complementarity effect. This is illustrated by the case of PV given FDI outward stock (flows), where the sign for the coefficient on G_d is positive and for $(G_d * G_h)$ insignificant, indicating a universal preference for a politically more stable host country. Without the complementarity effect, the positive sign for the coefficient on G_h implies that firms coming from a politically more stable country also have a universal advantage in outward FDI, all else being equal.

Given the estimates of the coefficients on institutions and their interaction term, we may also calculate how the marginal impact of a country's institution on FDI vary by the partner country's. In particular, the specification (19) implies that the marginal impact of the destination institution $G_{d,t-1}$ on FDI is $\partial \ln(FDI_{dht})/\partial G_{d,t-1} = \beta_8 + \beta_{10} G_{h,t-1}$, which is increasing in the home institutional quality if $\beta_{10} > 0$. As one country moves up the institutional quality ladder, it will attract more FDI only from countries of sufficiently good institutions satisfying $G_{h,t-1} > \widehat{G}_h \equiv -\beta_8/\beta_{10}$ and the FDI increment is more from countries of higher institutional qualities. Seen from a different perspective, the marginal impact of the home institution $G_{h,t-1}$ on FDI, $\partial \ln(FDI_{dht})/\partial G_{h,t-1} = \beta_9 + \beta_{10} G_{d,t-1}$, is increasing in the destination institutional quality if $\beta_{10} > 0$. A country of better institutions may not gain an advantage in outward FDI unless the destination is of sufficiently good institutions satisfying $G_{d,t-1} > \widehat{G}_d \equiv -\beta_9/\beta_{10}$, and the advantage is stronger with better destination institutions.

Given the coefficient estimates of G_d and $(G_d * G_h)$ in Table 2, the median of the cutoff $\widehat{G}_h$ across all institution indicators and FDI series is -0.43. This corresponds to approximately 0.43 standard deviation below the mean of the institutional quality distribution across countries.[14] Thus, not all FDIs are attracted toward countries of better institutions. Better institutions attract proportionally more FDIs from countries of better institutions. A non-negligible proportion of countries with institutional qualities at the lower spectrum ($\Phi(-0.43) \approx 33\%$ using standardized normal

[14]The WGI governance indicators have approximately a zero mean and unit standard deviation.

distribution as an approximation) in fact are attracted toward destinations of poorer institutional qualities. On the other hand, the median of the cutoff $\widehat{G}_d$ is -0.64 across all coefficient estimates of G_h and $(G_d * G_h)$ in Table 2. This indicates that a better institution at home can be a disadvantage for firms when investing in destinations of relatively poor institutional qualities (below the lower $\Phi(-0.64) \approx 26\%$ percentile).

3.3 Robustness Checks

3.3.1 with multilateral fixed-effects

Following Anderson and van Wincoop (2003), it has become a regular practice to control for the multilateral resistance to trade of the exporting and the importing country in empirical gravity models. Several alternative theoretical foundations have been provided for such multilateral effects; see for example, Eaton and Kortum (2002), Helpman et al. (2008) and Chaney (2008). In the FDI literature, Head and Ries (2008) and de Sousa and Lochard (2011) developed models for bilateral FDI that bear resemblance to the gravity equations for trade, suggesting the presence of multilateral home- and host-country effects. In view of this, I consider including destination-country-year and home-country-year fixed effects as a robustness check. The fixed effects are allowed to vary by year given the panel data structure.

This alternative specification has its pros and cons. On one hand, it reduces the concern of estimation bias due to omitted variables that are home-country-year or destination-country-year specific. For example, the corporate tax rate of the home and host countries may affect FDI but are omitted from (19); the fixed-effects terms control for all such omitted variables. On the other hand, this alternative specification does not allow us to separately identify the effects of variables that vary by home/destination country and year, such as GDP, GDP per capita, and the level of institutional quality, which can be of interest by themselves.

Table 3 summarizes the results with fixed-effects (FE) controls. The findings are quite similar regardless of the FDI series used (in stocks or flows, reported by the recipient or the country of origin). The institutional complementarity effect is robust to the inclusion of FE controls, and is statistically significant overall. The effect tends to be stronger for VA, GE and RQ, weaker for RL and CC, and absent for PV. This pattern suggests an interesting interpretation of the areas where

informal institutions are feasible and prevalent, and where they are not. Informal institutions tend to be built in response to inefficient public services or poor policy formulation/implementation (GE and RQ); these firm-specific investment corresponds to most likely political informal institutions such as political network or connections. To some extent, such political informal institutions may also help firms to maneuver in a society with less government political accountability (VA). On the other hand, economic and legal informal institutions such as relational contracting and private enforcement mechanisms seem to be relatively costly for firms to build in response to inefficient contract enforcement or rules of law (RL and CC). Finally, it appears extremely costly for firms to build legal informal institutions such as private troops to guard against political violence or terrorism (PV), given the weak institutional complementarity effect estimated in this area.

The Linder hypothesis of Fajgelbaum et al. (2015) is now clearly supported by the data. Most of the other variables (unreported) have qualitatively similar effects on FDI as in the benchmark, with some variations in their statistical significance across FDI series. Relative to the benchmark, the BIT has generally insignificant (rather than negative) effect on bilateral FDI, while the effect of RTA turns statistically positive.

3.3.2 with zero FDI observations

In the second robustness check, I take into account the presence of zero observations on FDI. The raw data differentiate between missing data (data that are not available or are not separately reported) and zero data (where the item is equal to zero or negligible). The pattern of zero and missing FDI data however suggests some degrees of measurement errors (e.g., the recipient country reports zero FDI while the origin country reports missing or positive FDI). Having no convincing way of correcting the data, I choose to use only the positive and zero FDI entries, and treat the missing FDI entries as literally missing and drop them from the analysis.[15]

In unreported exercises, I conduct Probit estimations and find that the same set of regressors in specification (19) have good explanatory powers of the likelihood of having an active bilateral FDI relation (in terms of either stocks or flows). In particular, the interaction term of institutions have the same positive effect on the likelihood of an active bilateral FDI status as on the volume of FDI

[15]I also drop the negative FDI entries from the analysis, as they cannot be accounted for by the current theoretical or empirical framework.

reported above. Given this, I estimate the joint effects on both margins using the Tobit estimation method à la Eaton and Kortum (2001). This is implemented by the STATA *intreg* command, where the left censoring point is allowed to vary across observations and set at the minimum positive value reported by each reporting country. For example, the lower censoring point is \$1 million US dollars for FDI inward stock reported by the United States, and \$2000 US dollars for FDI outward flow reported by El Salvador.

As shown in Table 4, the coefficient on $(G_d * G_h)$ now roughly doubles compared to the benchmark, and is significantly positive across all institutional quality indicators and FDI series. Overall, the complementarity effect is still the strongest in terms of VA, GE and RQ, and the weakest in terms of PV, with RL and CC somewhere in between.

Given the coefficient estimates on institutions, we can again calculate the lower bound $\widehat{G}_h$ for an increase in G_d to attract FDI from countries above the threshold, and $\widehat{G}_d$ for an increase in G_h to increase the home firm's FDI in destinations above the threshold. The median of these cutoffs across all FDI series and institution indicators are 0.19 for $\widehat{G}_h$ and -0.49 for $\widehat{G}_d$, indicating generally higher cutoffs than the benchmark. This is consistent with the finding of a stronger complementarity effect in the current estimation.

The evidence for the Linder hypothesis is not uniform: it is generally stronger in terms of the FDI stocks, and weaker or absent in terms of the FDI flows, similar to the benchmark. The coefficient estimates for most other variables (unreported) increase in magnitude relative to the benchmark, as may be expected given that OLS estimates of bottom truncated data tend to be downward biased toward zero. In particular, the sign of BIT turns around and becomes significantly positive. This indicates the importance of BIT at driving the extensive margin of FDI at the bilateral country level. For example, signing a BIT increases the latent bilateral inward FDI stock by around 30%, an economically significant figure. This is also supported by the unreported Probit estimations where BIT is found invariably to raise the likelihood of positive FDI.

3.3.3 more robustness checks

As mentioned above, the results are qualitatively similar if percentile rankings of institutional quality for countries are used instead of point estimates. The cutoffs for $\widehat{G}_h$ and $\widehat{G}_d$ correspondingly change and fall in the new range of $[0, 100]$ instead of $[-2.5, 2.5]$.

I also verify that the results are not driven by particular set of countries in terms of income levels. I conduct the estimations repeatedly by different income thresholds for the FDI recipient countries (eg, with an income level below 25%, 50%, or 75% of all countries in the current year). The institutional complementarity effect still holds in general, across variations in the estimation specifications or by allowing for zero FDI observations.

In dealing with zero FDI observations, I have taken the Tobit approach à la Eaton and Kortum (2001). This approach supposes that there is a minimum level of FDI, such that if the latent value FDI^*_{dht} falls below this threshold, we observe $FDI_{dht} = 0$ but otherwise we observe $FDI_{dht} = FDI^*_{dht}$. For example, FDI values that fall short of a certain threshold may fail to be recognized by government agencies. This approach is also consistent with a structural interpretation of zero FDI, where FDI activity is observed only if the profits of FDI exceed that of domestic production. Thus, the intensive and extensive margins (at the bilateral country level) are inherently related: a FDI relation is more likely to be dormant where potential FDI profit is small. Another popular approach in the trade literature proposed by Silva and Tenreyro (2006), in contrast, treats zeros as random realizations modelled by the Poisson process, and estimates the dependent variable in levels with the Poisson Pseudo Maximum Likelihood estimator (PPML). When I apply the PPML estimator to the FDI data, the results are not as regular as the Tobit estimates. The coefficient on the income difference has the wrong (positive) sign and rejects the Linder hypothesis of Fajgelbaum et al. (2015). The coefficient on the institutional interaction term is not as uniformly precisely estimated as in the Tobit estimation, although the signs are correct in most cases and statistically significant in several cases.[16]

To exclude the possibility that South-South FDI may be driven by their similarity in industrial structures, I repeat the estimations by including an index of industrial structure similarity between two countries in the list of regressors.[17] The industrial structure similarity index does not have a robust sign or significant effect on FDI flows. The coefficient on the institutional interaction term

[16]See Head and Mayer (2015, p. 178–180) for further discussions of these two approaches (Tobit and PPML), in particular, their difference in interpretations based on structural versus random zeros.

[17]The measure is constructed as $indsim_{dht} = 1 - \sqrt{\sum_{j=1}^{J}(va_{dt,j} - va_{ht,j})^2}/J$, where $va_{dt,j}$ is the value added of sector j in year t (as a percentage of GDP of country d) and similarly defined for $va_{ht,j}$. Data are taken from World Development Indicators, 11/12/2015 Update. Data are available on four distinct sectors: agriculture (ISIC divisions 1-5), manufacturing industry (ISIC divisions 15-37), non-manufacturing industry (ISIC divisions 10-14 and 38-45; including mining, construction, electricity, water, and gas), and services (ISIC divisions 50-99).

remains positive and significant overall across all estimations (benchmark, with multilateral effects, or with zero FDI observations). The findings regarding the Linder effect also remain more or less the same, with or without the extra control.

There may be concerns that the coefficient estimate on the institutional interaction term is picking up higher-order effects of institutions on FDI. However, any such nonlinear effects of institutions (such as $G^2_{h,t-1}$ and $G^2_{d,t-1}$) would have been absorbed by the multilateral home-country-year and host-country-year fixed-effects, and as shown in Table 3, the positive institutional complementarity effect is robust to the inclusion of such fixed effects.

Finally, culture (socially shared values) and institutions (socially shared rules) are two concepts that are sometimes difficult to disentangle, and likely to be highly correlated with each other. In the list of regressors in (19), I have controlled for dimensions of culture such as language and the current and past colonial relationships between countries. The above results show that institution has its own independent effects on FDI flows. I also repeated the estimations by including an index of religion similarity between countries as an extra control for cultural similarity.[18] Similarity in religion compositions between two countries helps raise bilateral FDI flows. However, the institutional complementarity effect remains positive and significant overall across all estimations (with the same caveat regarding PV).

4 Conclusion

In this paper, I propose a theoretical framework to micro-found the hypothesis that South-based MNEs have a comparative advantage to deal with the inefficiency associated with weak formal institutions and to maneuver in relationship-based investment environment, relative to their peers from the North. The theory predicts a complementarity in institutional qualities of the home and host countries in bilateral FDI flows. This helps explain the greater presence of South-based MNEs in countries of relatively poorer institutions.

I conduct an extensive econometric test of the theory using bilateral FDI for 219 economies in

[18]The religion index is constructed based on the religion dataset of Maoz and Henderson (2013). The index follows Maoz and Henderson (2013) and measures the similarity of religious compositions between two countries as $relsim_{hdt} = 1 - \sqrt{\sum_{r=1}^{R}(ra_{ht,r} - ra_{dt,r})^2}/R$, where $ra_{ht,r}$ is the proportion of population in country h in year t that are adherents of religion r and similarly defined for $ra_{dt,r}$. I used the top four religion categories: Christianity, Judaism, Islam and Buddhism. The results are similar if I use instead all 14 listed religion categories.

year 2001-2010. The results indicate a statistically significant complementarity effect between the home and destination institutional qualities. The finding is robust to the FDI series studied, the institution indicators used, the inclusion of multilateral country-fixed effects, and the consideration of zero FDI. The effect tends to be stronger with the inclusion of zero FDI and for dimensions of institutions where the scope for firms to build informal institutions is bigger. These are in line with the theoretical mechanism proposed in the paper and its implications.

In addition to predictions on the bilateral FDI activity at the country level, the paper's theoretical framework also suggests several interesting testable predictions at the firm and sectoral levels. In particular, a firm will choose to undertake FDI in countries of poorer institutional qualities, the poorer the institutional quality at home, the more productive the firm is, the larger the world demand for a sector is, and the less headquarter-intensive a sector is, all else being equal. I leave the test of these hypotheses to future work with firm-level and sectoral-level FDI data.

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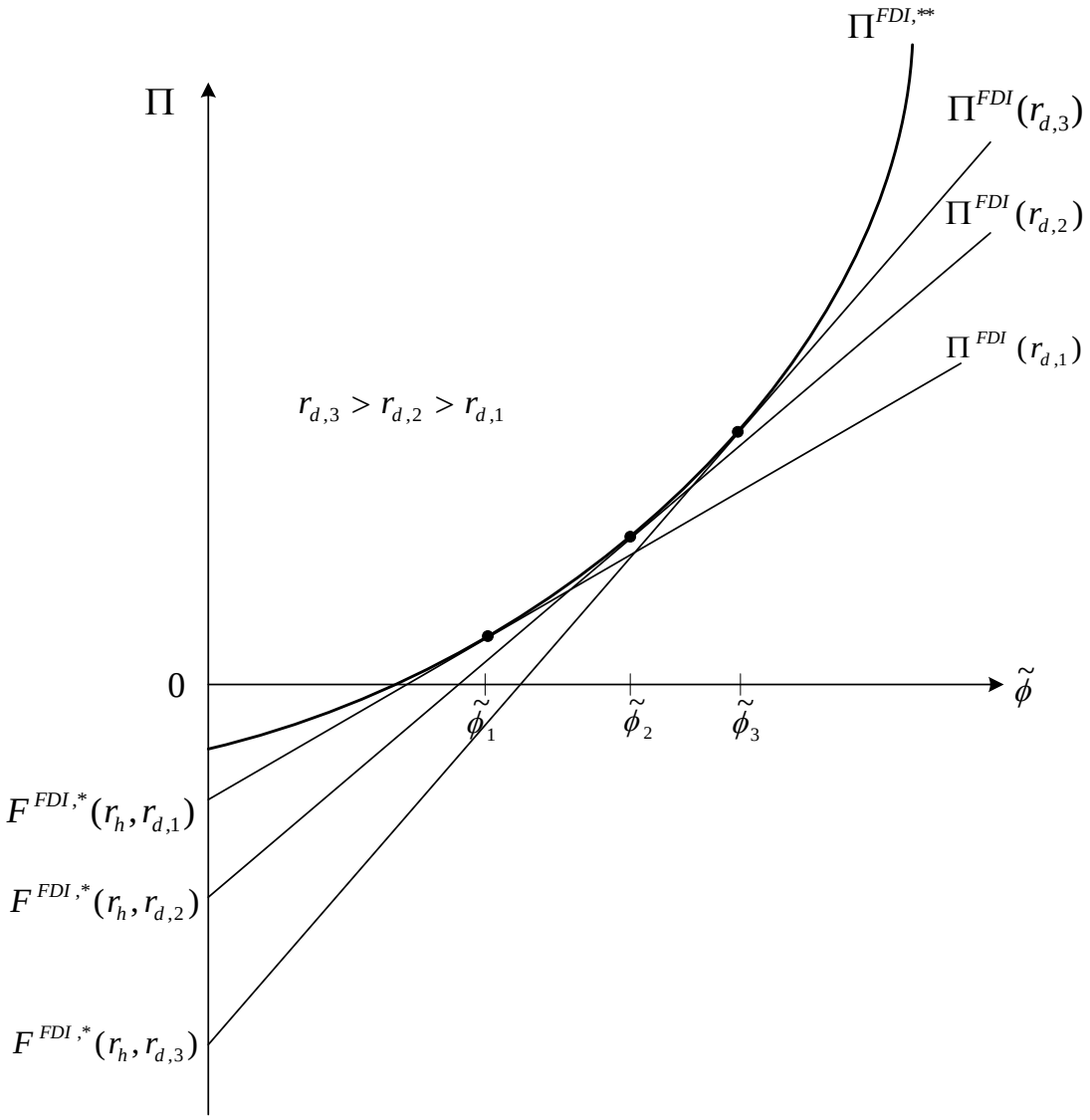

Figure 1: Profit Functions of FDI

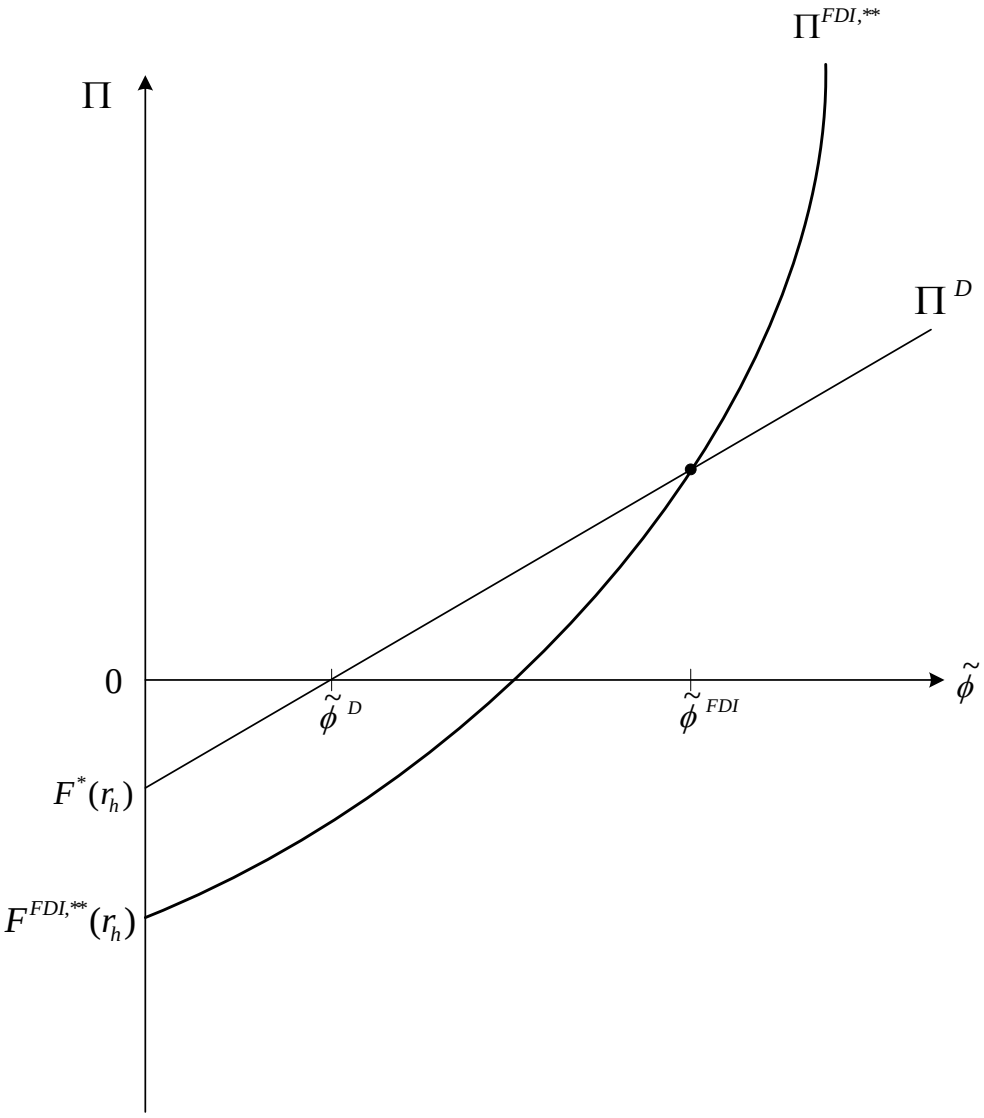

Figure 2: Sorting of Firms

Table 1: Positive bilateral FDI—inward stock reported by the recipient country

FDI inward stock	**VA**		**PV**		**GE**		**RQ**		**RL**		**CC**	
$\ln(gdp_d)$	0.586	***	0.617	***	0.565	***	0.581	***	0.584	***	0.584	***
	(0.020)		(0.022)		(0.020)		(0.020)		(0.020)		(0.020)	
$\ln(gdp_h)$	0.449	***	0.477	***	0.437	***	0.449	***	0.451	***	0.454	***
	(0.018)		(0.019)		(0.018)		(0.018)		(0.018)		(0.018)	
$\ln(gdppc_d)$	-0.029		-0.143	**	-0.146	***	-0.148	***	-0.138	**	-0.159	***
	(0.052)		(0.056)		(0.054)		(0.055)		(0.055)		(0.053)	
$\ln(gdppc_h)$	0.262	***	0.165	***	0.091		0.172	***	0.099	*	0.082	
	(0.054)		(0.058)		(0.057)		(0.057)		(0.058)		(0.056)	
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.125	***	-0.179	***	-0.066	*	-0.035		-0.073	*	-0.098	***
	(0.034)		(0.033)		(0.038)		(0.039)		(0.039)		(0.037)	
$\ln(p_d)$	-0.088		-0.088		-0.271	**	-0.303	**	-0.301	**	-0.342	***
	(0.136)		(0.120)		(0.125)		(0.125)		(0.124)		(0.124)	
$\ln(p_h)$	0.840	***	1.080	***	0.932	***	1.020	***	0.879	***	0.856	***
	(0.154)		(0.132)		(0.136)		(0.136)		(0.133)		(0.132)	
G_d	-0.124	**	0.167	***	0.150	**	0.164	**	0.168	**	0.224	***
	(0.054)		(0.049)		(0.072)		(0.080)		(0.066)		(0.059)	
G_h	0.097	*	0.175	***	0.257	***	0.017		0.290	***	0.310	***
	(0.051)		(0.047)		(0.059)		(0.069)		(0.060)		(0.050)	
$\boldsymbol{G_d * G_h}$	**0.267**	***	**0.082**	*	**0.298**	***	**0.400**	***	**0.283**	***	**0.210**	***
	(0.035)		**(0.042)**		**(0.045)**		**(0.055)**		**(0.045)**		**(0.034)**	
$\ln(distance)$	-0.486	***	-0.491	***	-0.525	***	-0.517	***	-0.509	***	-0.522	***
	(0.042)		(0.042)		(0.041)		(0.041)		(0.041)		(0.041)	
contig	0.535	***	0.513	***	0.552	***	0.567	***	0.560	***	0.531	***
	(0.130)		(0.130)		(0.128)		(0.129)		(0.129)		(0.128)	
comlang	1.164	***	1.204	***	1.100	***	1.145	***	1.106	***	1.049	***
	(0.090)		(0.089)		(0.088)		(0.088)		(0.089)		(0.088)	
colony	0.876	***	0.887	***	0.898	***	0.894	***	0.892	***	0.870	***
	(0.136)		(0.135)		(0.134)		(0.133)		(0.136)		(0.133)	
comcol	0.417	***	0.468	***	0.313	**	0.362	***	0.337	***	0.346	***
	(0.127)		(0.127)		(0.123)		(0.123)		(0.123)		(0.123)	
curcol	0.484		0.587	*	0.736	**	0.648	**	0.735	**	0.988	***
	(0.330)		(0.328)		(0.349)		(0.313)		(0.345)		(0.370)	
smctry	0.165		0.089		0.126		0.145		0.187		0.202	
	(0.229)		(0.228)		(0.225)		(0.227)		(0.227)		(0.225)	
rta	0.030		0.154	**	0.007		-0.017		0.037		0.064	
	(0.080)		(0.078)		(0.076)		(0.078)		(0.077)		(0.076)	
comcur	0.713	***	0.739	***	0.756	***	0.745	***	0.710	***	0.746	***
	(0.144)		(0.146)		(0.145)		(0.142)		(0.146)		(0.144)	
bit	-0.176	***	-0.229	***	-0.163	***	-0.212	***	-0.157	**	-0.110	*
	(0.064)		(0.064)		(0.062)		(0.062)		(0.063)		(0.062)	
# Observations	24974		24959		24970		24970		24974		24970	
R^2	0.528		0.525		0.539		0.535		0.537		0.541	

Note: Robust standard errors clustered by country-pairs are reported in the parenthesis. The entry ***, ** and * indicates statistical significance at the 1%, 5% and 10% level, respectively. All regressors (if time variant) are lagged one period relative to the FDI variable.

Table 2: Positive bilateral FDI—all stocks and flows

	VA		PV		GE		RQ		RL		CC	
FDI inward stock:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.125	***	-0.179	***	-0.066	*	-0.035		-0.073	*	-0.098	***
	(0.034)		(0.033)		(0.038)		(0.039)		(0.039)		(0.037)	
G_d	-0.124	**	0.167	***	0.150	**	0.164	**	0.168	**	0.224	***
	(0.054)		(0.049)		(0.072)		(0.080)		(0.066)		(0.059)	
G_h	0.097	*	0.175	***	0.257	***	0.017		0.290	***	0.310	***
	(0.051)		(0.047)		(0.059)		(0.069)		(0.060)		(0.050)	
$\boldsymbol{G_d * G_h}$	**0.267**	***	**0.082**	*	**0.298**	***	**0.400**	***	**0.283**	***	**0.210**	***
	(0.035)		**(0.042)**		**(0.045)**		**(0.055)**		**(0.045)**		**(0.034)**	
# Observations	24974		24959		24970		24970		24974		24970	
R^2	0.528		0.525		0.539		0.535		0.537		0.541	
FDI outward stock:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.087	**	-0.168	***	-0.053		-0.033		-0.081	*	-0.093	**
	(0.038)		(0.038)		(0.041)		(0.043)		(0.042)		(0.041)	
G_h	0.053		0.281	***	0.323	***	0.029		0.428	***	0.533	***
	(0.056)		(0.055)		(0.067)		(0.079)		(0.066)		(0.055)	
G_d	0.165	***	0.121	**	0.121		0.235	***	0.100		0.130	**
	(0.058)		(0.054)		(0.076)		(0.083)		(0.069)		(0.062)	
$\boldsymbol{G_d * G_h}$	**0.270**	***	**0.018**		**0.273**	***	**0.348**	***	**0.215**	***	**0.184**	***
	(0.037)		**(0.046)**		**(0.047)**		**(0.058)**		**(0.046)**		**(0.034)**	
# Observations	22793		22782		22793		22793		22793		22793	
R^2	0.522		0.516		0.528		0.525		0.525		0.535	
FDI inward flow:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.050	*	-0.085	***	0.060	*	0.053		0.010		0.016	
	(0.028)		(0.028)		(0.034)		(0.034)		(0.035)		(0.032)	
G_d	-0.103	**	0.214	***	-0.162	**	-0.066		-0.092		0.024	
	(0.051)		(0.046)		(0.069)		(0.076)		(0.064)		(0.057)	
G_h	0.097	**	0.076	*	0.092	*	0.007		0.207	***	0.130	***
	(0.047)		(0.045)		(0.053)		(0.062)		(0.054)		(0.044)	
$\boldsymbol{G_d * G_h}$	**0.248**	***	**0.133**	***	**0.395**	***	**0.444**	***	**0.289**	***	**0.263**	***
	(0.033)		**(0.038)**		**(0.044)**		**(0.055)**		**(0.044)**		**(0.033)**	
# Observations	19414		19403		19407		19407		19414		19407	
R^2	0.422		0.421		0.432		0.430		0.427		0.431	
FDI outward flow:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.019		-0.085	***	0.053		0.045		-0.003		0.011	
	(0.031)		(0.031)		(0.035)		(0.034)		(0.036)		(0.035)	
G_h	-0.034		0.119	**	0.174	***	-0.022		0.254	***	0.246	***
	(0.050)		(0.050)		(0.056)		(0.068)		(0.058)		(0.047)	
G_d	0.066		0.161	***	-0.107		0.041		0.010		0.019	
	(0.053)		(0.048)		(0.068)		(0.075)		(0.061)		(0.057)	
$\boldsymbol{G_d * G_h}$	**0.250**	***	**0.047**		**0.328**	***	**0.359**	***	**0.216**	***	**0.213**	***
	(0.032)		**(0.041)**		**(0.041)**		**(0.052)**		**(0.042)**		**(0.032)**	
# Observations	16305		16299		16304		16304		16305		16304	
R^2	0.442		0.436		0.449		0.445		0.444		0.449	

Note: See the note of Table 1. Coefficient estimates for the remaining regressors are omitted in the report.

Table 3: Positive bilateral FDI—all stocks and flows; with FE controls

	VA		**PV**		**GE**		**RQ**		**RL**		**CC**	
FDI inward stock:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.230	***	-0.314	***	-0.188	***	-0.236	***	-0.231	***	-0.198	***
	(0.030)		(0.031)		(0.037)		(0.036)		(0.038)		(0.036)	
$\boldsymbol{G_d * G_h}$	**0.174**	***	**-0.056**		**0.163**	***	**0.109**	**	**0.092**	**	**0.113**	***
	(0.032)		**(0.038)**		**(0.043)**		**(0.049)**		**(0.042)**		**(0.031)**	
# Observations	25692		25677		25688		25688		25692		25688	
R^2	0.716		0.714		0.715		0.714		0.715		0.715	
FDI outward stock:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.271	***	-0.397	***	-0.249	***	-0.276	***	-0.328	***	-0.257	***
	(0.034)		(0.036)		(0.042)		(0.040)		(0.042)		(0.042)	
$\boldsymbol{G_d * G_h}$	**0.184**	***	**-0.126**	***	**0.151**	***	**0.138**	***	**0.027**		**0.103**	***
	(0.034)		**(0.040)**		**(0.046)**		**(0.053)**		**(0.044)**		**(0.032)**	
# Observations	23323		23312		23323		23323		23323		23323	
R^2	0.721		0.720		0.720		0.720		0.719		0.720	
FDI inward flow:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.213	***	-0.280	***	-0.146	***	-0.179	***	-0.228	***	-0.187	***
	(0.029)		(0.030)		(0.035)		(0.034)		(0.036)		(0.035)	
$\boldsymbol{G_d * G_h}$	**0.195**	***	**0.024**		**0.222**	***	**0.202**	***	**0.087**	**	**0.118**	***
	(0.029)		**(0.033)**		**(0.038)**		**(0.045)**		**(0.037)**		**(0.028)**	
# Observations	19905		19894		19898		19898		19905		19898	
R^2	0.643		0.640		0.642		0.642		0.641		0.641	
FDI outward flow:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.223	***	-0.313	***	-0.197	***	-0.226	***	-0.271	***	-0.233	***
	(0.033)		(0.034)		(0.039)		(0.037)		(0.040)		(0.040)	
$\boldsymbol{G_d * G_h}$	**0.173**	***	**-0.048**		**0.158**	***	**0.135**	***	**0.036**		**0.071**	**
	(0.033)		**(0.037)**		**(0.041)**		**(0.049)**		**(0.039)**		**(0.030)**	
# Observations	16681		16675		16680		16680		16681		16680	
R^2	0.661		0.659		0.659		0.659		0.659		0.659	
Controls:												
Home Country * Year FE	Y		Y		Y		Y		Y		Y	
Destination Country * Year FE	Y		Y		Y		Y		Y		Y	

Note: See the note of Table 1. Coefficient estimates for the remaining regressors are omitted in the report.

Table 4: Zero augmented bilateral FDI—all stocks and flows

	VA		PV		GE		RQ		RL		CC	
FDI inward stock:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.126	***	-0.254	***	-0.053		-0.029		-0.056		-0.106	**
	(0.042)		(0.042)		(0.048)		(0.048)		(0.049)		(0.047)	
G_d	-0.095		0.355	***	0.161	*	0.287	***	0.059		0.156	**
	(0.073)		(0.069)		(0.092)		(0.105)		(0.087)		(0.077)	
G_h	-0.268	***	-0.009		0.068		-0.244	***	0.160	**	0.225	***
	(0.066)		(0.066)		(0.081)		(0.091)		(0.080)		(0.068)	
$\boldsymbol{G_d * G_h}$	**0.554**	***	**0.178**	***	**0.521**	***	**0.641**	***	**0.511**	***	**0.366**	***
	(0.047)		**(0.058)**		**(0.059)**		**(0.071)**		**(0.059)**		**(0.044)**	
# Observations	36587		36483		36567		36567		36587		36567	
# Zeroes	11613		11524		11597		11597		11613		11597	
FDI outward stock:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.135	***	-0.270	***	-0.101	**	-0.099	*	-0.122	**	-0.125	**
	(0.047)		(0.046)		(0.051)		(0.053)		(0.053)		(0.051)	
G_h	-0.258	***	0.293	***	0.626	***	-0.007		0.654	***	0.690	***
	(0.073)		(0.071)		(0.092)		(0.107)		(0.090)		(0.075)	
G_d	-0.039		-0.029		-0.159		0.159		-0.190	**	-0.156	*
	(0.075)		(0.074)		(0.099)		(0.113)		(0.092)		(0.080)	
$\boldsymbol{G_d * G_h}$	**0.514**	***	**0.121**	**	**0.442**	***	**0.502**	***	**0.393**	***	**0.354**	***
	(0.049)		**(0.061)**		**(0.062)**		**(0.077)**		**(0.062)**		**(0.046)**	
# Observations	35225		35134		35225		35225		35225		35225	
# Zeros	12432		12352		12432		12432		12432		12432	
FDI inward flow:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	0.006		-0.078	**	0.108	**	0.102	**	0.029		0.023	
	(0.037)		(0.037)		(0.043)		(0.043)		(0.044)		(0.042)	
G_d	-0.204	***	0.396	***	-0.286	***	0.000		-0.198	**	-0.055	
	(0.069)		(0.062)		(0.086)		(0.097)		(0.081)		(0.072)	
G_h	0.031		0.108	*	0.242	***	0.020		0.390	***	0.310	***
	(0.062)		(0.060)		(0.073)		(0.084)		(0.073)		(0.060)	
$\boldsymbol{G_d * G_h}$	**0.472**	***	**0.204**	***	**0.530**	***	**0.610**	***	**0.366**	***	**0.324**	***
	(0.044)		**(0.052)**		**(0.055)**		**(0.067)**		**(0.055)**		**(0.042)**	
# Observations	36340		36236		36315		36315		36340		36315	
# Zeros	16926		16833		16908		16908		16926		16908	
FDI outward flow:												
$\lvert\ln(gdppc_d) - \ln(gdppc_h)\rvert$	-0.056		-0.186	***	0.036		-0.009		-0.046		-0.027	
	(0.042)		(0.042)		(0.047)		(0.048)		(0.049)		(0.047)	
G_h	-0.206	***	0.253	***	0.327	***	-0.028		0.481	***	0.430	***
	(0.069)		(0.067)		(0.080)		(0.093)		(0.082)		(0.066)	
G_d	-0.061		0.096		-0.374	***	-0.022		-0.200	**	-0.197	**
	(0.072)		(0.068)		(0.091)		(0.106)		(0.083)		(0.076)	
$\boldsymbol{G_d * G_h}$	**0.547**	***	**0.144**	**	**0.555**	***	**0.546**	***	**0.394**	***	**0.383**	***
	(0.046)		**(0.058)**		**(0.056)**		**(0.071)**		**(0.058)**		**(0.044)**	
# Observations	32913		32832		32900		32900		32913		32900	
# Zeros	16608		16533		16596		16596		16608		16596	

Note: See the note of Table 1. Coefficient estimates for the remaining regressors are omitted in the report.